

REMARKS

Status of the Claims

Claims 20-37 are pending in the application. Claim 20 has been amended. Support for the amendment may be found on original specification page 13, lines 15-16. No new matter is being added.

Summary of Rejections

In the Office Action, claims 20-35 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent No. 4,177,153 to Lowe ("Lowe") in view of U.S. Patent No. 4,795,583 to Papay ("Papay") and U.S. Patent No. 6,844,301 to Field et al. ("Field"). Claim 36 is rejected under 35 U.S.C. 103(a) as allegedly being obvious over Lowe in view of Papay and Field as applied to claims 20-35, and further in view of U.S. Patent No. 5,344,579 to Ohtani et al. ("Ohtani"). Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lowe in view of Papay and Field as applied to claims 20-35, and further in view of U.S. Patent No. 6,225,266 to Watts et al. ("Watts").

All rejections are respectfully traversed. Reconsideration and allowance of claims 20-37 are respectfully requested in view of the present amendments and the following remarks.

Declaration

The Examiner has called for additional information regarding the test data discussed in the Declaration filed in the previous Office Action Response. In the last response, LFW-1 friction test data on two transmission fluid formulations was submitted. In the attached Declaration, additional information regarding the composition and amounts of components present in the inventive and comparative fluids is provided. Thus, it is clearly shown that inventive test data samples are within the scope of the presently claimed invention. Further, additional explanation is given from the inventor as to the technical effect of the presently claimed invention.

Claims 20-35 Are Patentably Distinguished Over Lowe in view of Papay and Field

Claims 20-35 are rejected under 35 U.S.C. §103(a) as being allegedly unpatentable over Lowe in view of Papay and Field. This rejection is respectfully traversed.

Claim 20 is an independent claim that defines a method for improving the friction durability of a transmission fluid. The method includes preparing a transmission fluid by adding to a base oil, an additive composition comprising: an ashless dispersant present in an amount from 3-5 wt% and an oil-soluble tertiary amine component, R1R2NR3, wherein R1 comprises about 1 to about 4 carbon atoms and R2 and R3 independently comprise about 8 to about 30 carbon atoms. In other words, the tertiary amine contains at least two relatively long chain hydrocarbon groups and at least one relatively short chain hydrocarbon group.

Lowe states, in its example fluids, that a dispersant is present in an amount of 6%. The present claims are outside the disclosure of Lowe. For at least this reason, the present claims are nonobvious in view of Lowe.

Further, nothing in Lowe teaches, suggests, or discloses a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups. Lowe discloses that amines having one relatively long chain hydrocarbon group having at least 11 carbon atoms are superior in oxidation performance. (See Col. 7, lines 19-26). Further, Lowe expresses in column 4, lines 13-15, a preference for tertiary amines having one relatively long hydrocarbyl chain and two relatively short hydrocarbyl chains. There is nothing in Lowe that teaches, suggests, or discloses a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups as claimed in claim 20. In fact, all of the examples in Lowe either have only one relatively long chain hydrocarbon group, all short chain hydrocarbon groups, or all long chain hydrocarbon groups.

The fact that Lowe considers the use of all classes of aliphatic tertiary amines **except** ones having two long chains and one short, would lead one of skill in the art reading Lowe to conclude that such amines would not be useful, and thus such a person would not be given any reason to explore the properties of compositions containing the presently claimed amines.

Lowe, in column 3, from lines 5-7, expresses preference for 0.01, or 0.05, or up to 0.3 percent by weight, whereas the present claims require at least 0.5 percent by weight of the tertiary amine. As evidenced by Figs. 2- 6, and as discussed on pages 15-16 of the specification, power transmission fluids containing 4.0 weight percent of the claimed tertiary amine have better friction durability than fluids containing 1.0, 0.5, or 0.0 weight percent of the claimed tertiary amine. Thus, the presently claimed combination of components, in the recited proportions, imparts the property of improved friction durability to the power transmission fluid. This property is neither predicted by the disclosure, nor possessed by the fluids, of Lowe. The presence of an unexpected effect not possessed by the alleged prior art is evidence of nonobviousness (MPEP 706.02(a) III).

Furthermore, the presently claimed method possesses an unexpected property not discernible from Lowe. The specification of Lowe teaches improved oxidation properties in crankcase oils. Friction durability is not considered in Lowe, nor would one of skill in the art infer from Lowe that friction durability could be affected by the use of any tertiary amine and dispersant combination, let alone the combination presently claimed. The claimed combination of an ashless dispersant and an aliphatic tertiary amine having two long chains and one short chain is critical to providing improved friction durability to power transmission fluids. In addition to the particular tertiary amine, the presently claimed weight range of the amine in the finished fluid is also critical to achieving the unexpected benefits of the invention.

The inventor has surprisingly found that a tertiary amine where R₁ comprises an alkyl or alkenyl group having about 1 to 4 carbon atoms and R₂ and R₃ independently comprise one of an alkyl, an alkenyl, an alkynyl, an alkylthioalkyl, a haloalkyl, and a haloalkenyl group having from about 8 to 30

carbon atoms provides significant advantages over other tertiary amines when utilized in a power transmission fluid. For example, it has surprisingly been found that the presently claimed transmission fluids can be used to control friction properties for longer periods than transmission fluids containing other tertiary amines. Test data and examples supporting these findings may be found in the specification as originally filed.

Additional testing was conducted on two fluids which data is included and further explained in the attached 1.132 Declaration. The attached version of the Declaration includes additional details regarding the sample formulations tested. In particular, the inventive formulation falls within the scope of the present claims. Further, the only component that differs between the two formulations tested is the tertiary amine used.

Two transmission fluid formulations, differing in that the Inventive fluid contained a tertiary amine including one methyl group (R1 of 1 carbon and an R2 and R3 of 12-14 carbon atoms) and the comparative fluid contained a tertiary amine including two methyl groups (R1 and R2 of 1 carbon atom and an R3 of 18 carbon atoms), were tested in the LFW-1 friction test (explained in detail at page 15 of the present specification). The comparative fluid would be similar to the teachings of Lowe, i.e., possessing one long chain and two short chains.

The formulations were each tested before aging and after aging, identified as "New" and "Aged", respectively, in the graphs included in the 1.132 Declaration. Measurements of friction characteristics were taken at the start of the test when the ring was stationary (the left-hand side of the graph) and as the ring gradually accelerated to its maximum speed (about 0.5 m/s in the center of the graph) and as the ring gradually decelerated back to zero (the right-hand side of the graph).

In order to assess the difference between the tertiary amine including a single methyl group and the tertiary amine including two methyl groups, the ratio of static to dynamic friction was calculated for each run. A difference of almost 10% was found between the "New" formulation containing one methyl group and the "New" formulation containing two methyl groups. A difference of almost 6% was found between the "Aged" formulations. Further, as discussed in the Declaration, it has been found that by including tertiary amines in transmission fluids in sufficient amounts and of the type presently claimed, the transmission fluid continues to effectively control friction properties longer than other transmission fluids. The present data demonstrates this since as the inventive fluid ages, the static to dynamic friction ratio shows a more significant decrease than the comparative formulation. The tertiary amines according to the presently claimed invention, do not significantly affect friction initially, but become increasingly effective as the fluid ages and the friction modifiers degrade and/or deteriorate.

Accordingly, there is a difference between the tertiary amines, and the selection of a tertiary amine as defined in the present claims does bring about an unexpected technical effect.

Papay discloses an automotive transmission fluid comprising, amongst other components, an aliphatic tertiary amine having one long chain and two short chain groups. (See Abstract). The amine is disclosed as containing one long chain having at least 10 carbon atoms and two short chains having up to 4 carbon atoms. Therefore, nothing in Papay discloses, teaches, or suggests a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups as claimed in claim 20.

Field discloses a synthetic ester-containing engine lubricant containing an amine-based friction modifier for improved engine performance and cleanliness. The amine-based friction modifier may be a tertiary amine containing a relatively short chain alcohol. Alcohol containing amines are outside of the scope of the present claims, as read in light of the teachings of the present specification (hydroxyalkyl groups are alcohols). The tertiary amine of present claim 20 defines R1 as comprising an alkyl or alkenyl. Therefore, nothing in Field discloses, teaches, or suggests a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups as claimed in claim 20.

Applicants respectfully submit that none of the cited references provide all of the elements and limitations of claim 20. Therefore, even if one of ordinary skill in the art were to combine these references in some way, that person would still not arrive at the presently claimed method for improving friction durability of a power transmission fluid.

Therefore, claim 20 is patentable over the combination of Lowe, Papay, and Field. Dependent claims 21-35 are also patentable over the references for at least the same reasons that claim 20 is patentable. Accordingly, reconsideration and allowance of claims 20-35 is hereby respectfully requested.

Claim 36 Is Patentably Distinguished Over Lowe in view of Papay and Field and further in view of Ohtani

Claim 36 is dependent on claim 20 and is rejected as being allegedly unpatentable over Lowe in view of Papay and Field, and further in view of Ohtani. This rejection is respectfully traversed.

Claim 36 is dependent from claim 20. And claim 20 is patentable over Lowe in view of Papay and Field, for at least the reasons discussed above. Ohtani discloses a lubricant composition comprising a hydroxyalkyl aliphatic imidazoline and a di(hydroxyalkyl) aliphatic tertiary amine. The di(hydroxyalkyl) aliphatic tertiary amine is disclosed as containing two hydroxyalkyl groups containing 2-4 carbon atoms and one aliphatic group containing 10-25 carbon atoms. Tertiary amines having hydroxyalkyl substituents are outside the scope of the presently claimed tertiary amines, which are disclosed on page 4 of the specification as including alkyl, alkenyl, alkoxyalkyl, or saturated or unsaturated fatty acids, but even if such groups were to be included in the scope of the presently claimed amine, Ohtani still teaches a tertiary amine with two short chain hydrocarbon groups and one long chain hydrocarbon group.

**RESPONSE AFTER FINAL REJECTION
EXPEDITED PROCEDURE - RULE 116**

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Therefore, nothing in Ohtani discloses, teaches, or suggests a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups, as claimed in claim 1.

None of the cited references disclose the particular tertiary amine as claimed in claim 20.

Therefore, the combination of Lowe with Papay, Field, and Ohtani remains manifestly deficient in providing all of the elements of claim 20 for at least the reasons discussed herein, and therefore the claim is patentable over the combined references. Accordingly, claim 36, as dependent upon independent claim 20, is likewise nonobvious and patentable in view of the cited combination of references, and reconsideration and allowance of claim 36 is hereby respectfully requested.

Claim 37 is Patentably Distinguished Over Lowe in view of Papay and Field and further in view of Watts

Claim 37 is dependent on claim 20 and is rejected as being allegedly unpatentable over Lowe in view of Papay and Field and further in view of Watts. This rejection is respectfully traversed.

Claim 37 is dependent from claim 20. And claim 20 is patentable over Lowe in view of Papay and Field, for at least the reasons discussed above. Watts discloses a zinc-free lubricating composition comprising, among other components, a friction modifier that is selected from the group consisting of succinimides and ethoxylated amines. The ethoxylated amine is disclosed as containing one relatively long chain and two ethanol groups. Therefore, nothing in Watts discloses, teaches, or suggests a tertiary amine containing one short chain hydrocarbon group and two relatively long chain hydrocarbon groups as claimed in claim 20.

The combination of Lowe with Papay, Field, and Watts remains manifestly deficient in providing all of the elements of claim 20 for at least the reasons discussed herein, and therefore the claim is patentable over the combined references. Accordingly, claim 37, as dependent upon independent claim 20, is likewise nonobvious and patentable in view of the cited combination of references, and reconsideration and allowance of claim 37 is hereby respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of all pending claims.

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FEES

It is believed that there are no fees associated with the present response. However, if this is incorrect, the Commissioner is hereby authorized to charge any deficiencies in fees or credit any overpayment associated with this communication to Deposit Account No. **12-2355**.

Respectfully submitted,
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